teristic inflated mass of ammonium amalgam is produced.

The very high electrolytic solution tension indicated by these reactions is confirmed by direct potential measurements. The values obtained, for similar conditions, are about .6 volt higher than those found recently by Lewis and Kraus for sodium amalgam. This result is in harmony with the enormously greater activity towards water of the organic amalgam. Dr. Moore and I have also made mono-methyl ammonium amalgam and studied its properties.

The facts just discussed point clearly to the probability that in general positive ions, if free, or even amalgamated with mercury, will possess metallic properties. Practically, however, several causes may prevent the isolation of such metallic bodies. We know that it is not possible by electrolysis to separate many metals like sodium from aqueous solutions of their salts. Similar relations may obtain in the electrolysis of an organic salt. On the other hand, it is theoretically possible that such a compound metal may be so unstable in the free state that it suffers spontaneous decomposition at the moment of its formation from its ions. A third possibility is exemplified by the case of hydrogen. For a long time it was thought by some chemists that hydrogen in solid form would have metallic properties, since acids may be considered "hydrogen salts." The fact that solid hydrogen is now known to have no metallic properties proves clearly the fallacy of the old idea and seems to be also a flat contradiction of the hypothesis in question.

Now, hydrogen differs from the metals in one other important respect: while the molecules of metallic vapors are always monatomic those of hydrogen are diatomic. Thomson has considered the question of the theory of the union of two like atoms to form a molecule of an elementary gas, and has shown very convincingly that it is reasonable to conclude that one atom sends its valence electron into the other and that the combination is entirely analogous to that when two unlike atoms combine. If this is the case, it is possible to understand why solid hydrogen has no metallic properties; its valence electrons are *bound* and not *free* nor *mobile*. Analogously to hydrogen, some organic radicals which can form positive ions of salts may unite in pairs to form double radicals. These would not be expected to have metallic properties.

In some cases, however, even hydrogen seems to have some metallic properties; it dissolves readily in palladium and, when nascent, diffuses easily through iron. The latter property of hydrogen may be due to continued existence in the monatomic and therefore metallic state.

As I have tried to point out, the electron theory of the metallic state would lead us to expect that free radicals, formed by the neutralization of the positive ions of salts by the introduction into each ion of that number of electrons represented by its valence would have metallic properties. The facts just reviewed, though few in number, seem to me to lend support to this hypothesis, and to lead to the conclusion that it is possible to prepare composite metallic substances, which may be termed synthetic metals, from constituent elements, some of which at least are non-metallic.

Herbert N. McCoy

December 28, 1910

WILLIAM RUSSELL DUDLEY.

William Russell Dudley, professor of systematic botany in Stanford University, was born on a farm in North Guilford, Conn.,

on March 1, 1849, and died at Los Altos, Cal., on June 4, 1911.

The fact that the writer has been intimately associated with Professor Dudley since the day he entered the freshman class at Cornell University, in September, 1870, will perhaps excuse the personal element in this little sketch.

The word "instructor" as a technical term, describing a minor assistant to a professor, had just then been invented, and the present writer had just been appointed "instructor in botany" under Professor Albert N. Prentiss.

One day, Professor Henry T. Eddy, now of Minnesota, brought to me a tall, well-built, handsome and refined young man, older and more mature than most freshmen, and with more serious and definite purposes. Young Dudley had an intense delight in out-door things and especially in flowers and birds. He wanted to be a botanist, and had turned from old Yale, to which as a descendant of Chittendens, Griswolds and Dudleys he would naturally have gone, to new Cornell, because Cornell offered special advantages in science, and because at Cornell a good man could, if need be, pay his own way. For the rest of my stay at Cornell, Dudley was my room-mate, living in a cottage on the hill, built by students and termed "University Grove." In this cottage was established the boarding-club, known later and appropriately as "The Struggle for Existence," and in later and more economical times as the "Strug." For a time, Dudley paid his way by rising at four o'clock to milk cows at the farm. Later he was made botanical collector, and this congenial work he kept up until he became my successor as instructor in botany. In college Dudley was a member of the Delta Upsilon fraternity, and took an active part in holding this society to the high ideals (dikaia upotheke) on which it was originally based. He was also a charter member in the honorary scientific society of Sigma Xi (spoudon xunones).

In 1871 I went with him to his home at North Guilford, and I remember that his practical father said to me:

> There comes Willie across the fields with his hands full of flowers, just as he used to. I wonder if there is any way he can make a living by it.

Dudley graduated from Cornell in 1874, with the degree of B.S. In 1876, he received the degree of M.S., after which he spent some time in botanical study in Strassburg and Berlin. From 1872 to 1876 he was instructor in botany at Cornell, his eminent knowledge of the eastern flora overbalancing the fact that at first he had not yet received a degree. From 1876 to 1892 he was assistant professor of botany at Cornell, with a year's absence in 1880, in which he served as acting professor of biology in the University of Indiana, in the absence of the present writer, who then held that chair.

In 1892, Professor Dudley became professor of systematic botany at Stanford University, which position he held until, in January, 1911, failing health caused his retirement on the Carnegie Foundation as professor emeritus, his work being then taken by one of his students, Associate Professor Le Roy Abrams.

Many of the leading botanists of the country have been students of Professor Dudley. H. E. Copeland, Kellerman, Lazenby, Branner were among his associates at Cornell. Atkins became his successor at Cornell. Abrams, Cook, Elmer, Olssen-Seffer, Cannon, Wight, E. B. Copeland, E. G. Dudley, Greeley, Herre, McMurphy and many others were under his tutelage at Stanford.

In Stanford University, Dudley was one of the most respected as well as best beloved members of the faculty. No one could come near to him without recognizing the extreme refinement of his nature; a keen intellect, an untiring joy in his chosen work, and the Puritan conscience at its best, with clear perceptions of his own duties to himself and a generous recognition of the rights and the aspirations of others.

Dudley entered with great joy into the study of the California flora. He became especially interested in the study of trees, the evolutionary relations of forms and especially the problems of geographical distribution.

The conifers of California were his special delight, and he made many field trips with his students to all parts of the state, notably to the Sierra Nevada and the Sierra Santa Lucia. His extended collections were presented to Stanford University, where with the collections of Dr. Abrams they form the major part of the large "Dudley Herbarium."

A genus of stone-crops, of many species, abounding on the cliffs of California and especially on those which overhang the sea, was named *Dudleya* by Britton and Rose. *Dudleya pulverulenta* is one of the most conspicuous plants in California wherever "sea and mountains meet."

Dudley was instrumental in inducing the state of California to purchase a forest of redwoods (*Sequoia sempervirens*), that this, the second of California's giant trees, might be preserved in a state of nature. Two thousand five hundred acres in the "Big Basin" of Santa Cruz County were thus bought and established as the "Sempervirens Park." For several years Dudley served on the board of control of this park.

Of the Sierra Club of California, Dudley was a leading member and for some years a director.

As an investigator, Professor Dudley was persistent and accurate, doing his work for the love of it. A partial list of his papers is given below. A large work on the conifers of the west was long projected, but still exists only in uncompleted manuscript.

Dudley was master of a quiet and refined but effective English style. He was one of those scientific men, too few I fear, who have real love for literature, and who understand what poetry is and what it is about. In his early days he wrote graceful verse. Three of his poems are in print, "The Kaaterskills as seen from the Taconics," "Sunrise on the Kaaterskill" and "A Legend of the Lehigh Valley." The last is the story of the Moravian settlements of "Friedenhütten, Tents of Peace, and Gnadenhütten, Tents of Grace."

From the first of these, I quote:

'Twas reached at last, with toiling long and weary
  Taconic's loftiest hill;
Then, vision of all visions, stood uncovered
  The domes of Kaaterskill!
They rose above the lesser hills as sovereigns
  Above the common herd;
They gathered then in conclave grand and solemn;
  They breathed no spoken word.
But full as anthemed voices of the ocean
  A soundless song was borne
Up from those lips that changeless through the ages,
  Sang on Creation's morn.

. . . . . .

A mighty calm sits on these silent summits,
  Time fades, as breath away,
O'er all in solemn oceanic pulsings
  Deep flows—Eternity.

From the "Legend of the Lehigh Valley," I quote the last verses:

Full six score years have passed away.
  Still on the silent summer morn,
At noon's repose, or evening's gray,
  O'er Lehigh's vale this dirge is borne.
    The reaper hears, on far-off hills,
    And traveler by the mountain rills,
    And fisher in the evening's chills;
They hear and feel some echo wake
  Of sorrow slumbering long. A tear
Is shed for some sweet lost one's sake,
  A tear that leaves life's stream more clear.
    They bless the song and them who sing;
    They feel the sympathy upspring
    That's born of human suffering.
The air is full of sad-toned bells
  That never cease their brazen toll;
With circling suns their pulsing swells,
  And in one tireless world-wave roll.
    But grateful unto sorrow's ear
    From the Lehigh, far or near,
    Comes this dirge so sweet and clear,—
    Come these human voices dear.

Professor Dudley's health was good until about three years ago, when he set out to study the trees of Persia. In Egypt he was attacked by a severe cold or bronchitis which ended in tuberculosis.

He was never married.

PARTIAL BIBLIOGRAPHY OF THE BOTANICAL WRITINGS OF WILLIAM RUSSELL DUDLEY

1. An Abnormal Orchid. Abstract from the Proc. of the Amer. Ass'n. for the Adv. of Sci., Vol. 32, August, 1883.

2. Another Disease of the Strawberry. December, 1889.
3. Big Basin Redwood Park. *Forester*, July, 1901, 7: 157.
4. The Big Trees of California. *Forester*, September, 1900.
5. The Cayuga Flora. Bull. of Cornell Univ., 1886.
6. Charles Christopher Frost. *Jr. of Mycology*, Vol. 2, 10 (October, 1886).
7. The Clover Rust. December, 1890.
8. Concerning the Vitality of *Sequoia sempervirens*. *Palo Alto Times*, March 17, 1908.
9. The Death of Dr. DeBary. *Bot. Gaz.*, Vol. 13: 64.
10. Directions for Laboratory Study. Anatomy and Histology of Plants. Cornell Univ., 1887.
11. Elias Magnus Fries. *Jr. of Mycology*, Vol. 2, August, 1886.
12. First Steps in the Study of Botany. *The Educationist*, Vol. 2, July, 1880.
13. Flora of the Lackawanna and Wyoming Valleys, 1892. (With Charles O. Thurston.)
14. Forestry Notes. *Sierra Club Bull.*, 1901–02.
15. Forestry Notes. *Sierra Club Bull.*, January, June, 1902–4: 71–74; (173–76).
16. Forestry Notes. *Sierra Club Bull.*, June, 1903–4: 71, 173, 246, 319.
17. Forestry Notes. *Sierra Club Bull.*, January, 1904–5: 82–85.
18. Forestry Notes. *Sierra Club Bull.*, January, 1905–5: 265–70.
19. Forestry Notes. *Sierra Club Bull.*, 1905–1906.
20. Forestry Notes. *Sierra Club Bull.*, June, 1908–6: 334–36.
21. The Genus *Phyllospadix*. Wilder quarter Century Book, Ithaca, N. Y., 1893.
22. The Hollyhock Rust. December, 1890.
23. A Laboratory Manual of Plant Histology. Crawfordsville, Ind. (1894). (With M. B. Thomas.)
24. Leafy Berries in *Mitchella repens*. *Bull. of the Torrey Bot. Club*, January, 1883, Vol. 10: 1.
25. Lumbering in the Sequoia National Park. *The Forester*, December (1900).
26. Near the Kern's Grand Cañon. *Sierra Club Bull.*, June, 1903, Vol. 4: 301–07.
27. A Notable California Fir, *Abies venusta*. *Forestry and Irrigation*, May, 1902, Vol. 8: 193.
28. The Onion Mold. December, 1889.
29. Phyllospadix. Its Systematic Characters and Distribution. Extract from *Zoe.*, February 26, 1894.
30. A preliminary List of the Vascular Plants of the Lackawanna and Wyoming Valleys. In Lackawanna Institute of History and Science, *Proc. & Coll.*, Vol. 1: 29.
31. Report of the Cryptogamic Botanist.
32. Sketch of Curtis. *Jr. of Mycology*, May, 1886, Vol. 2: 5.
33. Strassburg and its Botanical Laboratory. *Bot. Gaz.*, December, 1888, Vol. 13: 305.
34. The Strawberry Leaf-blight.
35. Trees along the Tulare Trails. *Sierra Club Bull.*, June, 1902 (Vol. 4: 153–56).
36. The Vitality of *Sequoia gigantea*. Read before the Alumni Association of Columbia University, January, 1905.
37. Zonal distribution of trees and shrubs in the Southern Sierra. *Sierra Club Bull.*, June, 1901, 3: 298–312.

DAVID STARR JORDAN

PROFESSOR WHITMAN'S COLLECTION OF PIGEONS

BIOLOGICAL investigators will be glad to know that the large and valuable collection of pigeons and birds which were the basis of nearly a score of years' work of the late C. O. Whitman are being maintained and kept together. The material upon which Professor Whitman's extensive evolutional and natural history investigations were made will thus be available while his manuscripts and records are being arranged for publication.

Very abundant material is at hand for a continuance of studies on hybridization, sex, fertility, instinct, etc., more than is now utilized to its full advantage.

Mrs. Whitman has arranged, as long as it is utilized, to keep together this material, priceless from its history, some of the birds having pedigrees reaching back for a long series of years. The collection has been gathered from all parts of the world, not only through long years which consecration to the work could alone have made possible, but also at great expense of money which could be made use of only through sacrifice. Those